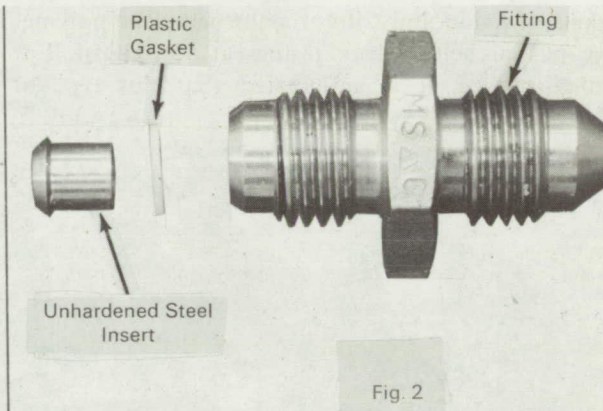
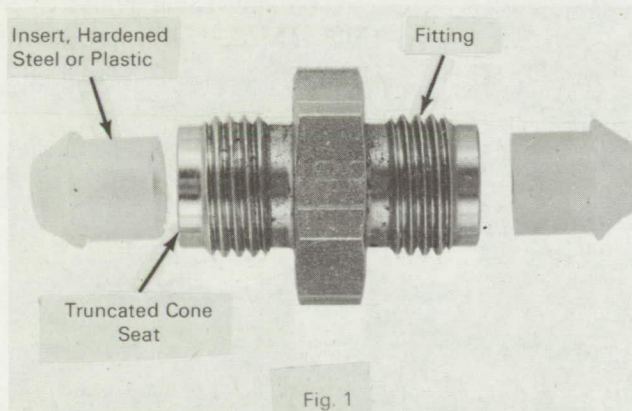


NASA TECH BRIEF



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Flared-Tube Fittings with Replaceable Seat Inserts



Three different design modifications of conventional flared-tube fittings have been under prototype development to provide easily replaceable cone seats for specific applications in fluid flow lines.

The first design, figure 1, is intended for fluid systems requiring all-metal leakproof seals for service at pressures exceeding 5000 psi and temperatures up to 800°F. In this design fittings of 302 stainless steel (Rockwell B90) with integral cone seats were modified (truncated) to accept replaceable precision-ground cone seats of 17H stainless steel hardened to Rockwell 43C. Units of this design were helium leak-tested with standard tube flares at 15,000 psi and showed no leakage at the cone seats or at the back seals between insert and fitting, even after repeated disassembly and reassembly of the units. Initial assembly makes the relatively soft tube flare cone (or the back seat of the fitting) conform to the precision geometry of the machined, hardened insert. These units will seal at normal B nut torquing values. This design should permit less costly replacement of worn or defective parts, since the inserts would

be less costly than unmodified fittings with integral hardened cone seats.

The second modification (Fig. 1) uses replaceable plastic cone seats instead of the hardened steel seats. Fittings of this design are intended for use at lower pressures and temperatures than the all-metal fittings. These fittings, with nylon inserts for example, can be sealed at low B nut torques and will protect tube flare surfaces against scratching or distortion during assembly. The fittings would not require high-precision finishing, and insert replacement would be low in cost. They should be serviceable in the 200-300 psi and 150-500°F ranges, depending on the plastic used. As determined from tests on prototype units, the fittings can be used in short-duration tests, as in leak testing, at pressures to 15,000 psi.

In the third design (Fig. 2) the flared-tube fitting is used with a replaceable unhardened steel insert and a plastic sealing gasket. Units of this design would be suitable for applications where the lower temperature limits of the plastic gaskets would be acceptable. The inserts would seal at lower B nut torque than the

(continued overleaf)

hardened steel inserts of the first design, would be less likely to scratch or otherwise damage tube flare surfaces, and would require less precision in manufacture. The repair of a fitting would normally require replacement of the plastic gasket only. The sealing characteristics of the fitting could be selected by using various plastic or elastomeric materials for the gaskets. Harder plastics, such as nylon, would give a higher resistance to cold flow; softer gasket materials, such as polyethylene, would permit sealing with finger-tightening of the B nut for temporary setups. The design of the insert is such that it slides into the fitting body as the B nut is tightened, so that cold flow of the plastic body which would permit leakage after a period of service is minimized. Units of this design modification with gaskets of nylon and trifluorochloroethylene polymer have passed helium leak testing at 15,000 psi. For normal service, it is anticipated that this type of

fitting could be used at pressures up to 5000 psi and temperatures up to 500°F.

Note:

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